

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (original) An optical switch comprising:
a first optical waveguide through which light propagates;
a second optical waveguide arranged at a position where optical crossing occurs with respect to the first optical waveguide, through which light propagates;
a first lead electrode arranged along the first and the second optical waveguides;
a pair of first control electrodes arranged along the first optical waveguide so as to face each other, with the crossing portion put therebetween, to which a control voltage controlling the crossing state is applied via the first lead electrode;
a second lead electrode arranged so as to face the first lead electrode; and
a pair of second control electrodes arranged along the second optical waveguide so as to face each other, with the crossing portion arranged therebetween, to which the control voltage is applied via the second lead electrode.
2. (original) The optical switch according to claim 1, wherein the first and the second lead electrodes are arranged so as to face each other, with the first and the second optical waveguides arranged therebetween.
3. (original) The optical switch according to claim 2, wherein the first and the second lead electrodes are arranged substantially parallel with each other.
4. (original) The optical switch according to claim 1, wherein the first and the second optical waveguides are arranged in a physically solid crossing state.
5. (original) The optical switch according to claim 1, wherein the crossing portion constitutes a 2 x 2 multi-mode interference coupler.

6. (original) The optical switch according to claim 1, wherein the crossing portion constitutes an X crossing waveguide.

7. (original) The optical switch according to claim 1, wherein the first and the second optical waveguides are arranged in the crossing portion, substantially in parallel with and close to each other.

8. (original) The optical switch according to claim 7, wherein a gap between the first and the second optical waveguides in the crossing portion is narrower than a gap between the first and the second optical waveguides in portions other than the crossing portion.

9. (original) The optical switch according to claim 7, comprising first and second chirp control electrodes arranged so as to face each other along the first and the second optical waveguides in the crossing portion, wherein a chirp control voltage is applied to the first and the second chirp control electrodes for controlling chirp of light output from either of the first and the second optical waveguide.

10. (original) The optical switch according to claim 1, wherein each of the first and the second control electrodes has a control electrode piece divided into a plurality of parts in the longitudinal direction.

11. (original) The optical switch according to claim 10, wherein each of the first and the second optical waveguides has a PIN structure in which an I-core layer is put between a P-cladding layer and an N-cladding layer, in regions other than the regions immediately below the control electrode pieces, which are adjacent to each other in the longitudinal direction, wherein corresponding control electrode piece is deposited on the P-layer,

the optical waveguide immediately below a region between the control electrode pieces adjacent to each other in the longitudinal direction has a structure in which the P-layer is removed from the PIN structure, and

the N-layer in the PIN structure is a common layer to the first and the second optical waveguides.

12. (original) The optical switch according to claim 1, wherein each of the first and the second optical waveguides has the PIN structure of a three-layer type, and the first and the second control electrodes are deposited respectively on the P-layer of the first and the second optical waveguides, and

the first and the second optical waveguides have a common N-layer.

13. (original) The optical switch according to claim 1, wherein each of the first and the second optical waveguides has the PIN structure of a one-layer buried type, and the first and the second control electrodes are deposited respectively on the I- layer of the first and the second optical waveguides, and

the first and the second optical waveguides have a common N-layer.

14. (original) The optical switch according to claim 1, further comprising a directional coupler type optical attenuator having

a third optical waveguide formed by extending at least one of the first and the second optical waveguides;

a fourth optical waveguide arranged in parallel with and close to the third optical waveguide, so that optical coupling occurs between the third and the fourth optical waveguides; and

a third control electrode arranged along the fourth optical waveguide, to change the refractive index of the core layer by applying an electric field to the core layer in the fourth optical waveguide.

15. (original) The optical switch according to claim 1, comprising a directional coupler having first and second ports, wherein light output from either of the first and the second optical waveguides is controlled to be output from either of the first and the second ports, by changing an external voltage.

16. (original) The optical switch according to claim 1, comprising a directional coupler having first and second ports, wherein light output from either of the first and

the second optical waveguides is guided to the first and the second ports to control the output ratio between the respective first and second ports.

17. (original) An optical communication system comprising an optical switch including

a first optical waveguide through which light propagates;

a second optical waveguide arranged at a position where optical crossing occurs with respect to the first optical waveguide, through which light propagates;

a first lead electrode arranged along the first and the second optical waveguides;

a pair of first control electrodes arranged along the first optical waveguide so as to face each other, with the crossing portion put therebetween, to which a control voltage controlling the crossing state is applied via the first lead electrode;

a second lead electrode arranged so as to face the first lead electrode; and

a pair of second control electrodes arranged along the second optical waveguide so as to face each other, with the crossing portion arranged therebetween, to which the control voltage is applied via the second lead electrode.

18-32. (canceled)